Legacy effects of marine larval development for a diadromous species

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NZ whitebait fishery

- Culturally and commercially important
- 200-300 tonnes p.a. (?)
- Catching juveniles
- $120 kg^{-1}

Five amphidromous Galaxiidae species

- All spawn above water level in riparian zone

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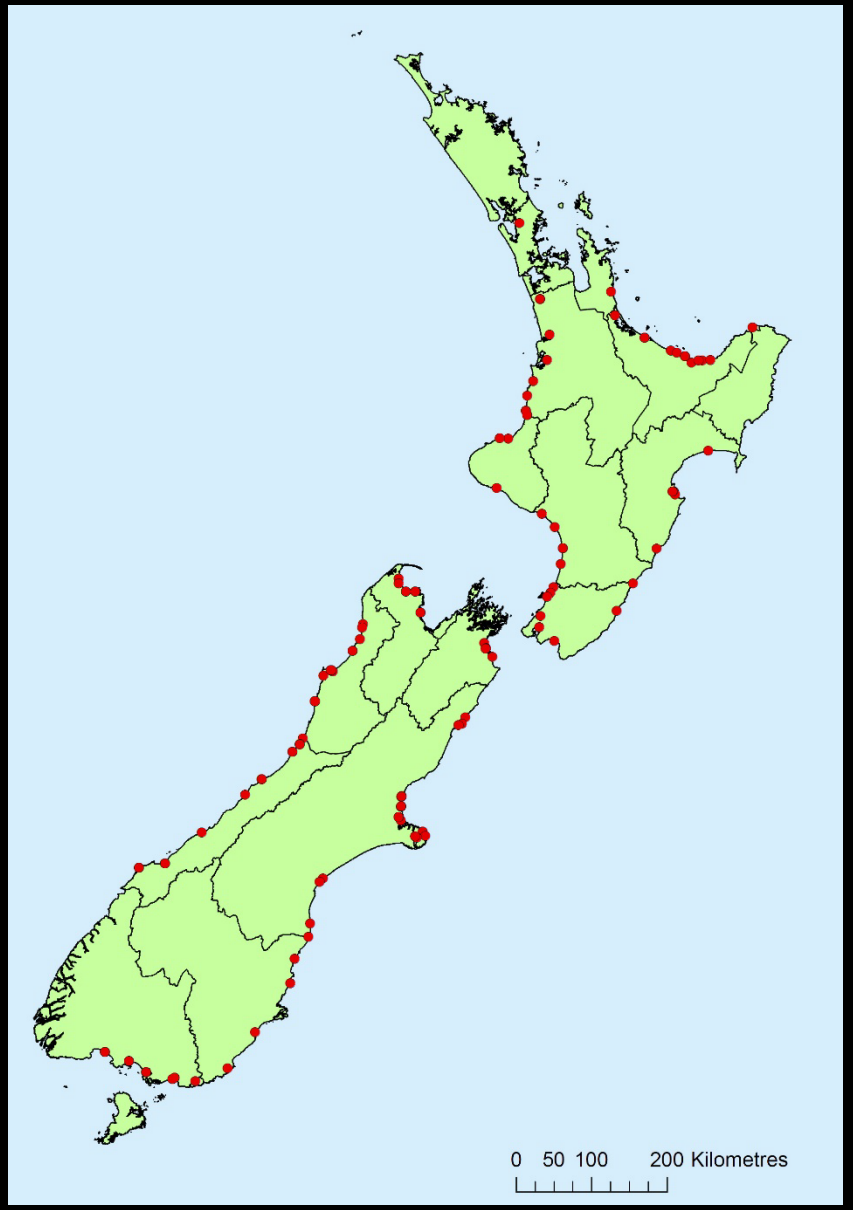
Whitebait sampling locations

- 92 rivers sampled (July – Dec 2015)
- >200 whitebait sample^{-1}
- 65,000 whitebait identified to species level

- 30 fish species^{-1} sample^{-1} measured
- 17,800 whitebait measured/weighed



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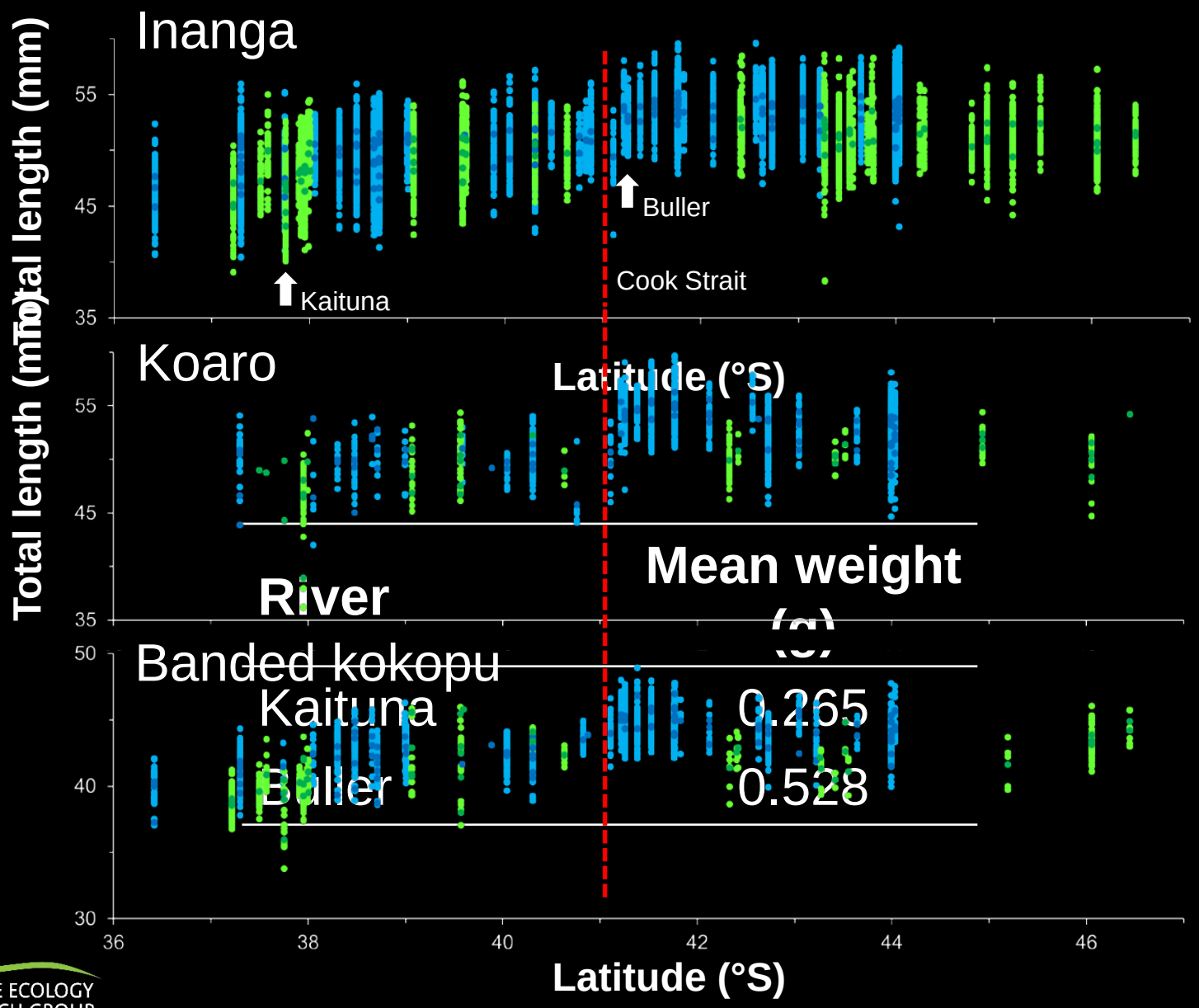
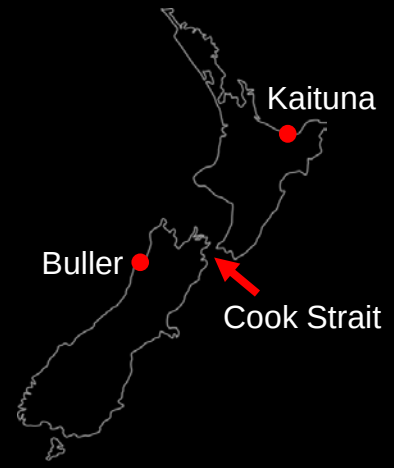
Northern whitebait are smaller



River | Mean weight (g)
Kaituna | 0.265
Buller | 0.528

East coast
West coast



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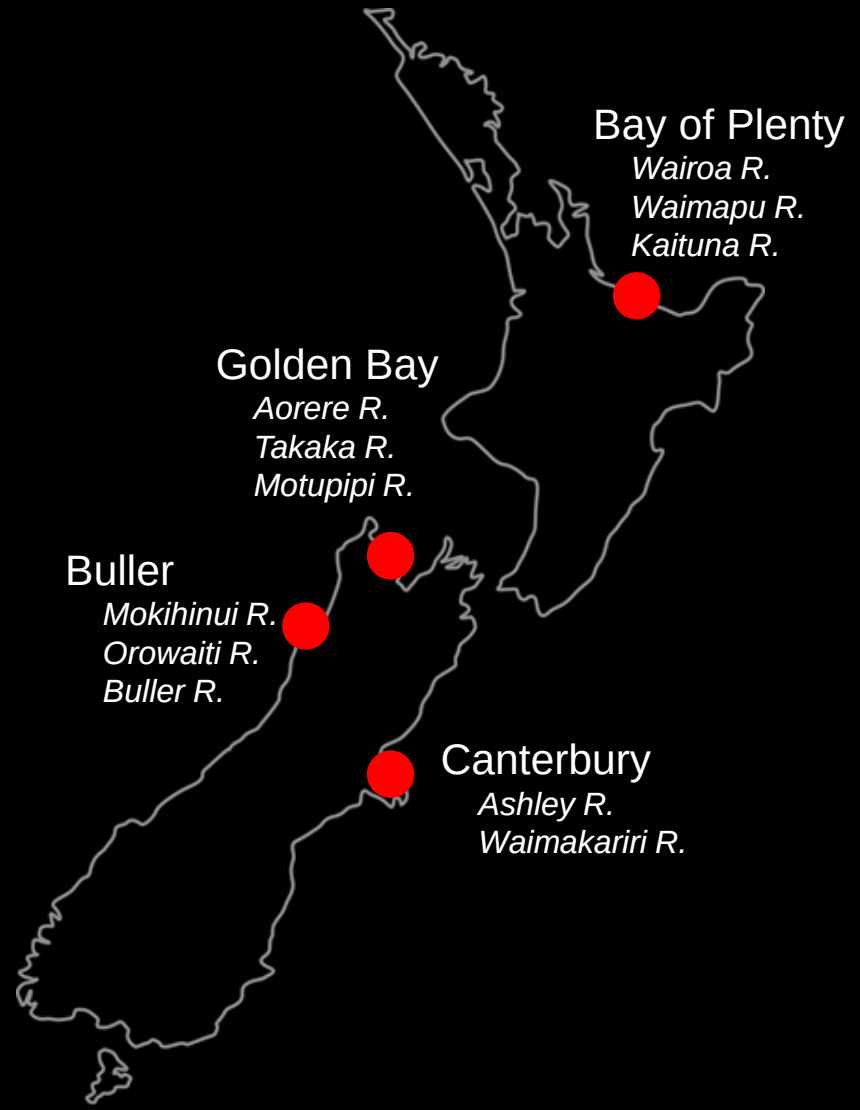
Inanga whitebait sampling for ageing

- 50 inanga whitebait river^{-1}, twice a month for 3 months (Sep–Nov 2013)
- Measured, weighed, frozen



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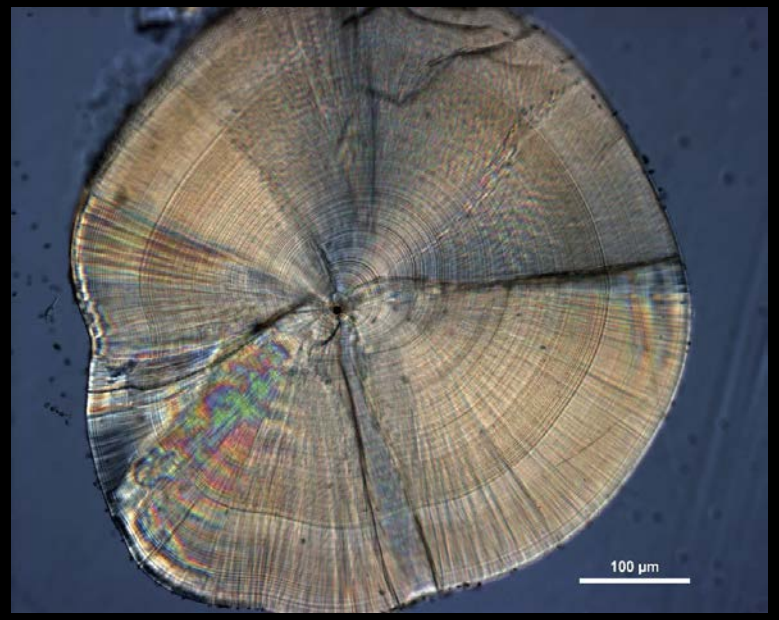
Ageing whitebait otoliths



- Otoliths extracted and polished
- Age estimated from counts of daily rings ($n \geq 15$ river^{-1} month^{-1})
- Hatch season derived (autumn vs. winter)

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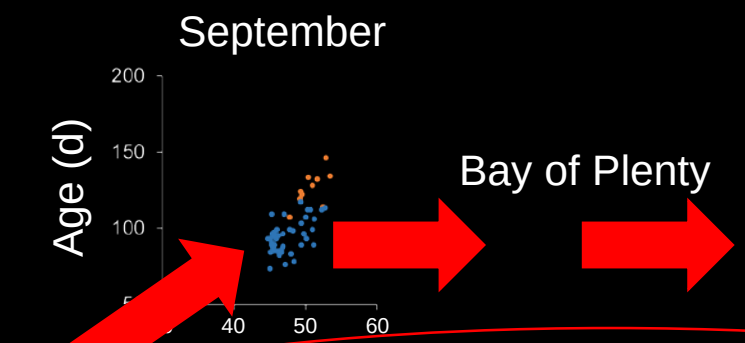
Northern inanga whitebait are smaller and younger

- Autumn hatched
- Winter hatched

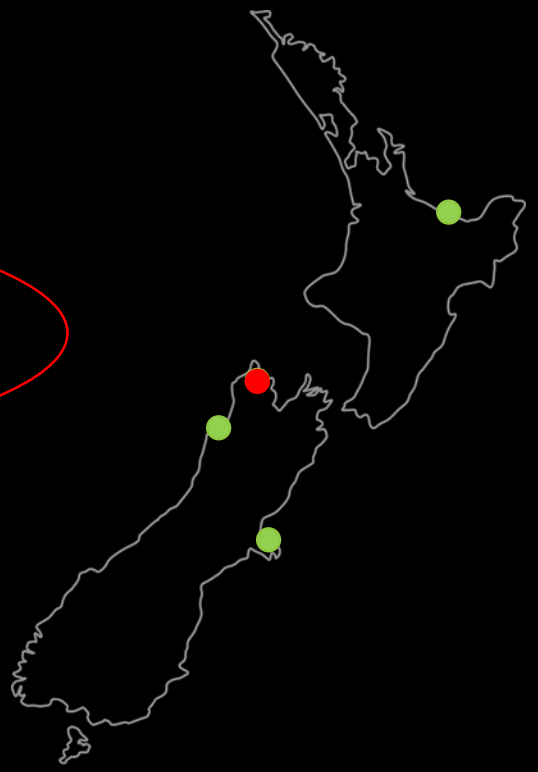
Most northern whitebait hatch in winter



Bay of Plenty

$\bar{x}$ = 141 d

$\bar{x}$ = 120 d



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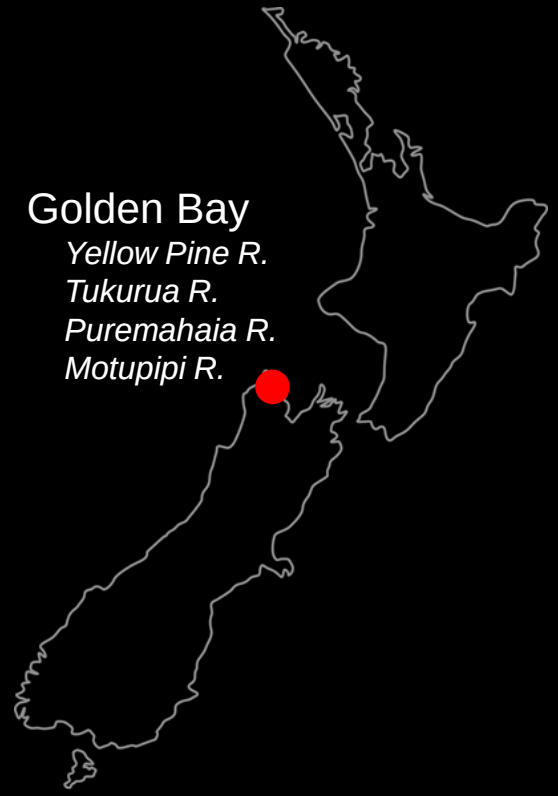
Adult inanga sampling for growth



- 70 fish month^{-1} (Jan – Apr 2014) river^{-1}
- Measured, weighed
- Gonads staged and weighed
- Larval and adult growth history determined from otolith increment widths

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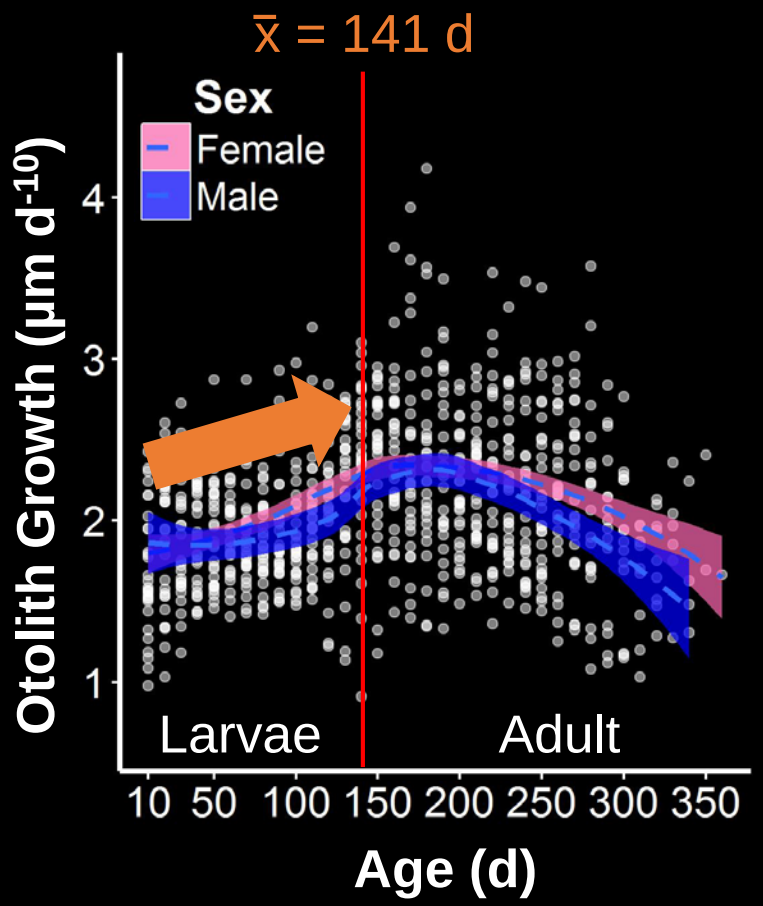
Winter-hatched larvae grow more quickly

Autumn



er adult growth
reases more
rapidly

Winter-hatched mature adults are younger but not smaller

Female

Male

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Summary

	Eggs		Larvae	Whitebait		
Latitude	Spawning	Majority hatch	Growth	Age	Size	Condition
North	Late autumn - winter	Winter	+	-	-	=
South	Late summer - autumn	Autumn	-	+	+	=

	Mature adults		
Hatch season	Age	Size	GSI
Winter	-	=	=
Autumn	+	=	=

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Conclusions

- Pelagic and adult growth are decoupled
- Environmental conditions coincident with hatching (e.g., SST/productivity) affect lifetime growth
- Winter hatching risky, but the reward is better marine and freshwater conditions = better growth

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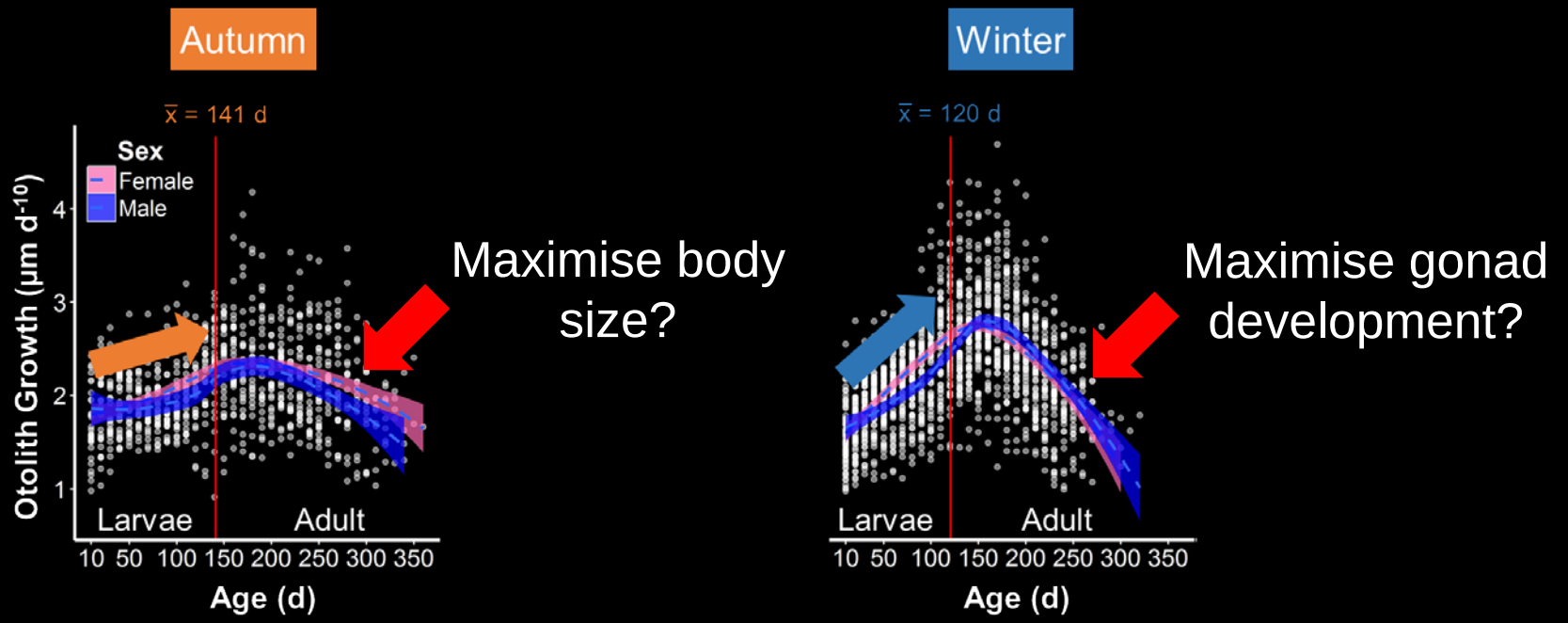
Conclusions



- Do autumn-hatched adults delay switch from somatic growth to gonad development to maximise body size (fecundity) at spawning?
- Do winter-hatched adults divert energy to gonad development to avoid spawning at sub-optimal times?

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